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**THE SCHOOL OF ENGINEERING
GEORGE WASHINGTON UNIVERSITY**

THE MECHELECIV

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● LET'S DO SOMETHING

During this past summer one of the students asked the Engineers' Council to consider the appointment of a committee which would be charged with recommending steps which might improve spirit in the Engineering School. At the time of this editorial no action has been taken by the Council in this matter, and accordingly it might be well now to suggest some steps which we think would act to improve spirit generally.

One of the most important steps which could be taken would be to increase the interest in engineering activities shown by the faculty. At no meeting of the engineering societies in recent months has every faculty member been present. Some faculty members have an unbroken record of non-attendance at such meetings, and this is particularly true of those professors who instruct night classes only. It does not seem sufficient for a professor to stand and lecture to his class for fifty minutes if he really wants such men to become well-rounded engineers. He should be sufficiently interested in the welfare and education of those men to spend some extra time in their presence, particularly when the students have repeatedly shown that they are very much interested in having him be present.

Faculty members can show their interest also in the classroom when they are asked to make announcements of engineering activities and meetings. Certainly the students would be more interested in attending if the professor announced the event and then stated that he would see them at the event. The feeling of continuity from classroom to meeting engendered in the student is exactly the feeling which everyone attempts to produce in their talks. This is a concrete method of achieving the desired end.

It is not our intention to suggest that none of the professors have followed the suggested practices. Certain of the professors have been most diligent in their attendance at society meetings, as well as being present on field trips undertaken by the students. It is noticeable that they have done so. The students speak of these professors and mention opinions they have put forward, with such regularity that one would assume there are no other professors at the university. It is very definitely our suggestion that the remaining professors follow the lead which these progressively-minded men have set for them.

A step toward school spirit on the part of the Council would be to consider the action of its own members. It is not at all unusual for some of the Council members to be absent or late, although their meetings are held only once each month. Why could not the Council itself make a rule that when a member is absent from several meetings his position is vacated, and the society or fraternity which he represents will be asked to elect or appoint a successor? If the position he holds is important to campus welfare, the member should be willing to go to considerable effort to carry out the obligations of that office. He could, in fact, go so far as to think out in advance of each meeting what motions he wants to bring up and how the motions should be worded. Many Council meetings degenerate into discussion periods, with each man offering his opinion in a very loud voice so he can be heard over the others.

In improving Council action, the individual societies and fraternities certainly should expect each of their Council delegates to make a full report at the society meeting, in order that all members can indicate their approval or disapproval, and suggest what action they feel should be taken on matters before it is taken. Furthermore, the individual society should give specific instructions to their delegate as to matters they want brought up, in the form of resolutions which the society members have voted on. If the Council delegate sees fit to ignore such instructions

ENGINEERING SCHOOL CALENDAR

September and October 1950

- October 3—Tuesday—Mecheleciv Staff meeting, 8:15 p.m., Room 303, Student Union Annex.
- October 4—Wednesday—Annual Fall Engineers' Mixer, 8:15 p.m., Hospitality Hall, Heurich's Brewery.
- October 11—Wednesday—Theta Tau meets, 8:15 p.m., Room D-200.
- October 18—Wednesday—Sigma Tau meets, 8:15 p.m., Room C-205.
- October 19—Thursday—Engineers' Council meets, 8:15 p.m., Room 303, Student Union Annex. All welcome.
- October 25—Theta Tau meets, 8:15 p.m., Room D-200.
- November 1—Wednesday—Engineering Societies meet, 8:15 p.m., Hall of Government. All welcome. November Mecheleciv out.

it would be clear to the society that he is not properly representing them, and should be replaced with a new delegate.

Within a short time now we will be occupying new quarters in a building of our own. That certainly should help us to become the closely integrated group we want to be, but the building alone cannot make the change for us. The change is partly to be achieved by physical action, but mostly by an alteration in our own mental approach. The type of building in which you sit will not cause you to ask the man next to you in class his name, nor can it cause you to remember that name and use it every time you see the man on the campus. Only you can do that.

In recapitulation, we believe the time to act is now. We want the professors to wake up and show that they are here to encourage as well as to instruct. We want the societies and fraternities to demand real representation by their delegates to the Engineers' Council. We want the Council members to start preparing themselves for action before going to their meetings. Last, and a vital thing, we want every student to realize that his school spirit starts in his mind. He should make a special point of learning the names of his classmates, eating with them in the cafeteria, and meeting with them in the societies and fraternities. In short, let's get hot and do something!

Has anybody got a better program to suggest?

TABLE OF CONTENTS

Electrification of Railroads	page 4
Rating of Water Current Meters	6
The Power Capacitor	7
Alumnews	8
Personalities	9
News and Views	12
Dean's Column	14
Societies & Fraternities	15

About our Cover

Diesel electric locomotives of the type shown are rendering excellent services on both freight and passenger trains on modern American railroads. Shown is the front of a Pennsylvania Railroad 3-unit, 6000 hp. Diesel electric passenger locomotive.

from the editor's mailbox

This space is intended to serve as a forum for student and alumni opinion. Opinions expressed are those of the writers, and not necessarily those of the Mecheleciv. Address communications to: Editor's Mailbox, the Mecheleciv, Student Union Annex, George Washington University.

—THE EDITORS.

August 22, 1950

Dear Editor,

I am writing to put in my gripe as an honest student about all the copying and cheating that goes on in the School of Engineering. Not that I claim that there is no cheating going on in the other parts of the University, but I only notice it from the honest Engineer's viewpoint.

It is downright unfair for me to have to stay up all night writing a report for E.E. laboratory and getting a "C" on it because it is original and therefore not as polished as those turned in by other students, since these are the distillations of the best of several previous reports which the other people copied in fifteen or twenty minutes.

It is even more disgusting to me to sit in an examination when I

have burned the midnight oil trying to learn the subject and see the pin-ball boys and the fraternity boys collaborating with each other after having had a gay old time loafing through the semester. The brutal part about it all is that these parasites will get good marks and pull up the curve, making it even tougher for those who really do their own work.

I realize there is no use in griping to you unless I make some suggestion as to how to curb this evil. I suggest that the Faculty of the School of Engineering and the Engineers' Council make a joint survey as to the practicality of instituting an "honesty board" consisting of several students who act as anonymous observers and are required to report all instances of cheating to the instructors. This system has been tried with considerable success at William and Mary University concerning violations of school regulations. I am depending on you, as a forthright and progressive publication, to print this letter.

Midnight Oil Burner.

• The Engineers' Council welcomes students at its meetings, particularly when they advance suggestions —Ed.

September 1, 1950

Dear Editor,

In one of the downtown Washington papers I read a news story about the new Engineering Building, in which they called it an "Engineering and Technological Building".

I am writing to you about this because I am not sure what that meant and I thought maybe you could clear it up. I certainly hope that after the Engineers have been kicked around for years by our effete Physics Department we are not going to let those guys horn in on our new building and try to take that away from us, too.

If you can find out about this and let the students know what is planned in time for us to do something we may yet be able to block this action. It would seem that the magazine could perform a real service to the students by jumping on this quickly.

Sincerely,

Atomic Reactor.

• We are not sure of the meaning of this, either. We are asking the Dean's office for further information. —Ed.

Electrification of Railroads

by W. H. Seabrooke

Undergraduate in Civil and Industrial Engineering

Engineering for railroads has absorbed lifetimes of study by a great many men. Almost every phase of railroading has its exacting engineering problems, but none is more exacting than the power supply. The various types of locomotives have been studied exhaustively in every detail, with three objectives in mind: maximum tractive effort, economy of operation, and weight.

The use of electric power to haul trains has provided a very fertile field for investigation. Electrification of locomotives can be divided into two general fields, from one of which our modern Diesel electric locomotive has been developed. This field, using electric drive for the wheels, is concentrated on the economical generation of power in the locomotive. The development of gas turbine operation will probably be considered one further step in this field. Generally speaking, the combination used permits a wider flexibility than is true in the second field, where central station electric power is used.

In developing the use of central station power, there are three points which must be considered as integral parts of the engineering problem. A suitable drive for the locomotive requires an electric motor with speed characteristics which will start heavy loads and move them at high speeds. Secondly, the power supply system by which current is brought to the locomotive and delivered to the drive motor must be considered, while as a third point economy of operation is essential.

Students in the early electrical engineering courses will recognize that the alternating current system meets all requirements for the power supply system. Generated at a central station, transmitted readily at high voltages, and picked off the carrier wire by pantograph, it can readily be stepped down in voltage by a bank of transformers carried on the locomotive, and delivered to the drive motor. However, this kind of current does not lend itself well to the drive problem. The speed characteristics of most alternating current motors are such that there is a low torque at starting, with high torque at the higher operating speeds. Now a locomotive must deliver very heavy torque to start the load, but at operating speed it is only necessary to deliver sufficient torque to overcome friction and wind resistance. Therefore an AC motor of the ordinary type capable of starting the load would produce far too much torque at operating speeds.

In spite of the obvious problems, AC rail electrifica-

tion was started nearly fifty years ago. In 1897 the Westinghouse company built several 60-cycle, series-wound, single-phase motors for use in a packing house. According to B. G. Lamme, primarily responsible for the construction of these motors, they were the real predecessors of the single-phase, commutator type railway motors brought out some three or four years later. It had been discovered that a single-phase series motor has unidirectional torque with alternating voltage and current applied. This motor, however, employs a commutator and thereby introduces new problems.

Commutation of an AC motor is even more difficult than it is on a DC motor. The AC field creates by transformer action a circulating current in the coil being short-circuited by a brush. This circulating current adds to the load current and increases the total current to be commutated. On the motors used, it was necessary to insert a small resistance between each commutator bar and the armature coil connected to that bar, thereby reducing the circulating currents. This principle is called the use of resistance lead. These series motors were used in 1907 in the electrification of the New York, New Haven and Hartford Railroad.

The series commutating motor is used exclusively on the Pennsylvania mainline electrification, which employs 11,000 volt, 20-cycle alternating current. Although the basic principle of the series motor has remained constant in this application, several combinations of resistance leads, interpoles, and compensated-field poles have been used. The present trend is to emphasize the resistance-lead feature and use interpoles.

A development of some interest was used by the Pennsylvania Railroad in 1915, when the doubly fed series motor appeared. In this motor part of the power is fed to the armature winding by transformer action during heavy-current starting. This makes it unnecessary for all of the current to pass through the commutator, and at low speeds the armature and series field can be reconnected for operation as a repulsion motor, further reducing the use of the commutator.

The use of direct current, transmitted from the central station, is highly desirable from several standpoints. A direct current series motor has the exact speed characteristics which are desired. Starting torque is very high, dropping off with increased speed. The motor is easily controlled, operates smoothly, and

provides the needed flexibility. Such motors are used in Diesel electric combinations, and on street traction systems. On the street traction system, the power is picked up from a third rail, or an overhead trolley, and fed directly into the motor. Most of us are familiar with the general results, both in street cars and in trackless trolleys. In the Diesel electric locomotive, a Diesel prime mover operates a direct current generator, from which the current is fed into the motor. In the gas turbine operations generally being considered, the gas turbine will operate the direct current generator, which will feed the motor. In all of these cases the actual drive is by a direct current series motor.



Modern electric locomotive of the Pennsylvania Railroad operating between New York City and Washington, D. C.

In spite of the desirability of using direct current, the transmission problem is such that the use of this current is awkward. For rail electrification, there is one point at which the voltage being transmitted is vitally important. As the current is picked off the carrier wire by the pantograph on the locomotive, there is a sliding contact between the pantograph shoe and the carrier wire. A single sliding contact can pick off the wire a maximum of about 500 amperes. Since the driving motors require a large power supply, in watts, this requires that the voltage on the line be very high. A second reason for desiring to transmit power at very high voltages is inherent in the transmission characteristics.

The wire being used for the transmission of any power presents a resistance which the power must overcome. In computing the loss from this resistance, there are two parts to consider, one being a drop in voltage which is called IR drop, and the other the heating effect, which is I^2R . In the first case, it is a simple multiplication of the current times the resistance, but in the second case it is the current squared times the resistance. Obviously, then, the current magnitude is a thing which must be kept to an absolute minimum. Power is current times voltage, and

if the current is to be kept low the voltage must be kept high. If it can be made very high, line losses will be low and the current picked off the carrier wire can also be lower than would be necessary at low voltage in order to get the same power into the locomotive.

It would appear that the simplest answer to all of this is to generate high voltage current at the central station, transmit it to the locomotive, and feed it directly into the motor. At this point the major problem in the use of direct current becomes troublesome. A direct current series motor feeds current into the field and through the armature in a continuous line by the use of a commutator element rotating with the armature. From this commutator the current is picked off by brushes, which places a definite limitation on the voltages which can be used. Furthermore, the central station generator for direct current must also use a commutator, again limiting the voltages which can be used. And to complete the sad picture, it is not possible by any means presently known to step direct current up and down by transformers, since transformer action depends entirely on the changing flux in the magnetic field.

The solutions to these problems have been many. One school of thought has attempted to increase the voltage limits, and use the highest possible voltage, which has resulted in systems as high as 5000 volts. The Chicago, Milwaukee and St. Paul system electrified its line in the Rocky Mountains in 1915 with 3000 volts and a regenerative braking system. Experiments have been conducted as high as 7000 volts. None of these has ever been considered truly competitive because of difficulties with motor insulation and high-voltage current control.

One solution to the problem has been to generate and transmit alternating current at high voltages, step it down in the locomotive with a transformer bank and use it to operate an alternating current motor, pulling a direct current generator which produces the desired voltage for operation of the direct current drive. In such solutions it is obvious that the locomotives must produce sufficient power to haul the train plus the power to haul around a great deal of heavy equipment, necessary only to change the voltage. The Great Northern Railroad employed this system in its electrification in 1927. The Virginian Railway has employed this system in some of its recent locomotives.

A solution which has many proponents is the transmission of high voltage alternating current, stepped down in the locomotive, and rectified to direct current voltage. This rectification is based on the principles of electronics, that is, on the rectification of current by means of electron tubes.

The principle of electron tubes is a complex subject, and can hardly be discussed in this article. However, the tubes used specifically for rectification can be con-

(Continued on page 18)

Rating of Water Current Meters

by John W. Lewis

Undergraduate in Civil Engineering

Water current meters are used wherever an estimation of the rate of water flow is desired and are utilized in the determination of stream discharge, tide currents, flow in irrigation canals, and similar cases. They are primarily used by government agencies, and are rated by the Hydraulics Division of the National Bureau of Standards.

One type of current meter in wide use today is the Large Price, Type A. The essential parts of this meter are: the rotating bucket wheel, which has five conical buckets mounted on its periphery; the electrical contacts which give a signal, either every revolution for slow moving streams, or every five revolutions for more rapid waters; the vanes which keep the meter parallel to the direction of flow; and the frame.

The bucket wheel is supported in a yoke at the front of the frame by a tempered steel needle point on the bottom and a loose fitting brass bearing on the top, the main purpose of which is to resist horizontal thrust. The wheel is rotated by the water hitting the open base of a cup on one side of the wheel, while on the other side the apex of another cup faces against the direction of flow and the water flows around it, causing very little resistance to rotation. The bearings are lubricated with a mixture of kerosene and sperm oil which was developed by the Geological Survey, one of the largest users of current meters.

The electrical contacts are mounted in a chamber at the top of the yoke. When the meter is used in the field, the contacts are connected in a circuit containing a set of earphones. The operator counts the revolutions by the clicks in the earphones.

The vanes, at the rear of the frame, are set at right angles to each other and resemble the guide vanes of a bomb, or rocket, when mounted. A movable weight is mounted in a slot in one of the vanes, to provide a means for balancing the instrument. The entire instrument is constructed of nickel plated brass, and when fully assembled is about eighteen inches long.

The rating is done in a tank six feet by six feet by four hundred feet, by towing the meters with an electric car which runs on a track of thirty pound rail and a six foot eight inch gauge. The car is supplied from an overhead protected duct with 220 volt DC current for the ten horsepower driving motor, and 110 volt AC current for the stroboscopic speed indica-

tor, timers, and calculating machine. The velocity of the car is controlled with a hydraulic transmission, making possible any speed from zero to about eighty-two feet per second.

For the standard rating, the meters are mounted on rigid streamlined rods and are immersed about eighteen inches in the water. Cable ratings are made on request with the meter suspended on a one-eighth inch steel cable which is kept vertical by a streamlined, finned lead weight that hangs below the meter. The weights range from ten to two hundred pounds, the size depending upon the speed.

A standard Large Price meter rating consists of two runs at each of six speeds; 0.25, 0.5, 1.1, 2.2, 4.0, and 8.0 feet per second. The speed of the car is determined by a stroboscopic speed indicator. An aluminum disk, driven from one of the wheels of the car, rotates in front of a white neon light that is flashing at the rate of sixty times per second. Holes have been drilled in the disk in a pattern of concentric rings, with the holes in any given ring being equally spaced around the ring, but the spacing of the various rings is different. There is a separate ring spaced particularly for each of the speeds mentioned above, or multiples of that speed. The disk is designed so that when the car is going at a particular speed, each hole in the ring corresponding to that speed will move up and occupy the position of the previous hole in the exact time that the neon light is out (one-sixtieth of a second). Thus, each time the light flashes on, succeeding holes are caught in the exact position that preceding holes were in at the last flash. This creates the illusion that this specific ring of holes is standing still. If the ring of holes seems to move in the opposite direction to that in which the disk is moving, the operator knows he is going too slow, and conversely, if the ring appears to move in the direction the disk is moving, the operator is going too fast.

To make a run, the car is brought up to speed and a switch is thrown closing a circuit between the meter and a stepping relay, which is actuated and advances one position each time the points in the meter make contact. After about two test contacts the relay closes a separate circuit which starts the timing clock and fires a dart from a spring loaded gun on the side of the car into a wooden scale beside

(Continued on page 17)

The Power Capacitor

by Edward Egloff

1950 Graduate in Electrical Engineering

After a slow start, the power capacitor has become a major component among electrical equipment. Capacitors are now being applied to power systems at the rate of one and a quarter million kva per year. About ten million kva are now in service in the United States.

The curve of use of power capacitors resembles the path of a jet propelled fighter plane gaining altitude. Thirty years ago there were only trial or experimental installations in service; twenty years ago, a meager 300,000 kva had been added to lines; only ten years ago the figure had not yet reached a million and a half.

Use of shunt capacitors to correct power factor began in a tentative trial as far back as 1912. But the failure rate was nothing to be proud of on the early units, which were made pretty much on a laboratory basis. In 1924, the Westinghouse Corporation built a factory just to manufacture capacitors, and quantity production with appropriate quality controls began.

Power companies started to use capacitors only recently. Until about 1936 they were usually applied by consumers of power, the decision being on the basis of the savings in power bills. In 1936, the Westinghouse Corporation brought out the first outdoor, or weatherproof capacitor, with sealed case and solder-sealed terminals—a unit that could be mounted in the open, on a pole, without the cost and bulk of protective housings. Since then the use of capacitors by power companies has grown steadily.

Installations of power capacitors have become sizeable. One power system has in a fairly concentrated installation over 100,000 kva of capacitors. The largest industrial installation is about 50,000 kva. Blocks of 10,000, 20,000 and even 30,000 kva are fairly common.

Behind the steadily rising use of power capacitors is, of course, the declining bulk and cost per kva. Two decades ago they weighed about ten pounds per kva. This figure declined continuously with the 15-kva units, standard until recently, until it stood at about 3.3 pounds per kva. With the new 25-kva unit, the figure drops to below three pounds.

Several factors have led to the steady improvement in capacitors. The switch in impregnating liquid from oil to non-inflammable chlorinated hydrocarbons brought a sharp reduction in size. This is because of the much better dielectric constant of the new material. Another feature is non-inflammability, which makes it possible to install capacitors in the open in industrial plants, thus eliminating the necessity of a

vault type enclosure and thereby reducing the installation cost.

The improvement in impregnant came all at once. The improvement in paper has come by degrees. The problem has been to produce a paper completely free from conducting particles, with low electrical losses, and without ionic components that are leached out of the paper by the liquid. Production of a capacitor paper has become a highly developed specialty. It is made from carefully selected wood, such as hemlock, and processed with utmost care to produce a paper that is as pure cellulose as possible. It is also one of the thinnest papers made, being 0.00035 inches thick.

The metal foil used today is quite different from that of 25 years ago. Then it was "tin foil", composed of 85% lead and 15% tin, being one half mil thick. Soon aluminum fabricators were able to provide aluminum foil of the same thickness, giving an approximately four to one saving in weight. The thickness has been reduced at intervals, so that now the aluminum foil used is but one quarter mil thick. This represents an eightfold saving in foil weight since the first commercial capacitors.

A most important factor in capacitor manufacture is the extreme care with which every step must be performed. This has brought about a host of rigid processes and quality controls difficult to evaluate specifically but without which the modern capacitor would be impossible.

Power capacitors have many uses. Most common and the best known is to correct power factor and to improve voltage regulation of 60-cycle power distribution systems. They are also used for energy storage in resistance welders, surge generators, and airport runway indicators. They are used as high-frequency filters, as tuning units, and to discriminate between frequencies. Used in series instead of shunt they compensate for power line reactance during rapid load changes. Series capacitors are used with resistance welders to compensate for reactance and thus reduce the kva inrush peaks. Power capacitors are an unquestioned must with high-frequency generators. For example, a 4500-kva, 5000-cycle induction furnace is served by a 100-kw generator. Without the 4500-kva capacitor, the high-frequency generator would have to be designed for 4500-kva.

The power capacitor, compact, silent, and motionless, is figuring more prominently in modern electric power systems. It is a reliable, efficient power device. While it has changed little in appearance in a quarter of a century, except in size, it embodies almost as much research and development as any major electrical equipment.

ALUMNEWS

Success stories are always interesting, and so it is with distinct pleasure that we publish, through the courtesy of Professor Ames, the following letter from the General Electric Company, concerning fellow alumnus George Rixse:

"Dear Professor Ames:

Many of our Test Sections have as leaders and supervisors test engineers from the Test Training Program. These men chosen for these supervisory positions are those who have demonstrated leadership ability during their test assignments. In most cases, the men are not considered for such positions until they have been with the Company for at least six months.

Although the usual length of such an assignment is six months, it is possible that some men will be asked to take additional supervisory responsibility, such as head of a Test Section.

We thought you would be interested in knowing that G. E. Rixse, BEE 1948, has been chosen to take a supervisory position—or 'sign-up' as we call it—at our Pittsfield Works. This is his second 'sign-up', and he started this new work on July 17, 1950.

Very truly yours,
D. S. Roberts
Assistant Manager,
Technical Recruiting Division

Merwyn K. (Pop) McKnight, BEE 41, who was recently elected president of the Engineering Alumni Association, has appointed a five-man alumni advisory board for the Mecheleciv. The committee includes William F. Roeser of the National Bureau of Standards (see "Engineering Personalities" elsewhere in this issue), George F. Tittington at the Public Buildings Administration, Frank H. Bronough at the U. S. Patent Office, Harold F. Link at the Navy Department, and Lawrence K. Hyde of the O. S. Peters Company. Mr. Roeser will act as chairman of the board, which is charged with liaison between the Mecheleciv and the Association and providing assistance and advice for the student staff. The assumption by the Association of increased responsibility concerning the growth of the Mecheleciv spotlights the importance of this committee.

Fred Ritchie, BME 49, has resumed his studies in the Law School. He tells us that he has never had it so tough, as he ruefully surveys last year's Law School report card. Fred was a Sigma Tau in Engineering School.

Two lucky 1950 graduates have found employment in firms owned by their parents. Frank Seal, BEE 50, has entered his mother's firm, Seal and Company,

while Floyd Jennings, BCE 50, is an estimator for Floyd A. Jennings, Plastering Contractor. Mr. Jennings also employed Dick Koester, BCE 50, as an estimator.

Dick Daniels, BEE 50, who had a really distinguished career as an undergraduate (ex-Engineers' Council, ex-Mecheleciv, Sigma Tau, Omicron Delta, Kappa, etc.), will hear those wedding bells ring in December, when he will marry Cynthia Phillips, Delta Gamma, also a George Washington graduate.

Three of last year's graduates are proud owners of new automobiles, as well as new sheepskins. Bill Whittemore, BEE 50, has chosen a Mercury (after a thorough engineering investigation, no doubt), John Connor, BEE 50, has a Studebaker, and Al Craft, BEE 50, has a Plymouth. There must be money in this electrical engineering business. Whittemore is working with Brush and Company. Connor and Craft are sales engineers and estimators for the Alexandria Building Supply Company.

George Tittington, BCE 50, and former Mecheleciv staff member, also joined the fathers this summer. George tells us that little Susan weighs over thirteen pounds as this is written. George is a construction engineer for the Public Buildings Administration, now engaged in supervising construction of a new hangar at the Gravelly Point airport. His job sounds like a dream job for a Civil Engineer.

The United States government has employed a number of recent graduates. Frank Thompson, BME 50, is a Plumbing Inspector for Arlington County, while George Goforth, BCE 50, and Rudolph Vogel, also BCE 50, have joined the already large group of George Washington alumni at the Blue Plains Sewage Disposal Plant as inspectors.

Ed Brzozowski, BEE 50, is selling real estate. Ed Egloff, BEE 50, former Mecheleciv staff member, has gone to work for Combustioneer Corporation --- Barnes Procter, BME 50, and former Mecheleciv staff member, is with the Kellogg Company in New York --- Howard Grayson, BME 50, is working for Hoppe Heating Engineers. Theta Tau will miss Grayson when singing time starts at the end of those famous beer parties.

ENGINEERING PERSONALITIES



When one looks at the majority of students who feel they have little time for any activities except problems and lab reports, it is certainly stimulating to find a student who has an outstanding record of leadership, not only in engineering extra-curricular activities but in all-University organizations as well.

Charles H. Plyer, Jr., came to the nation's Capital in 1939 after completing his high school work at Forest Lake Academy in Orlando, Florida. Although his dad is a cartographic engineer, at that time Chuck had no desire to associate himself with engineering and so entered Benjamin Franklin University, working for his Bachelor of Commercial Science degree. While attending school here, he took a position in accounting with the Washington Gas Light Co. By the time war was declared at the end of '41, Chuck had his degree and already had been promoted to accountancy supervisor.

Plyer enlisted in the Navy December 8, 1941, and received his commission two months later. It was while stationed at the Bureau of Aeronautics that Chuck began engineering night school at GW, joining Kappa Alpha Order during this period. After seventeen months of red tape, he was given six months training in gunnery school and shipped to Pearl Harbor, where he was grabbed up quickly by an air base which needed an ordnance officer, given a lieutenant's grade, and kept there for nine months. He was then shipped to Midway and remained there two and one-half years, during which time he was promoted to lieutenant commander, and finally received his orders home.

Returning to DC in September of '46, Plyer immediately resumed both his studies at George Washington and his job at the Washington Gas Light Company. His first campus recognition here was his election to the presidency of KA in '47, the year in which he edited the University Freshman Handbook. Joining the ASME during the fall term began his professional engineering associations. The following Christmas found him meeting the girl of his dreams, who became Betty Lou Plyer in September of 1948.

Married life didn't seem to slow Chuck down much, for in the summer of 1949 he became Editor in Chief of the engineering school news magazine, and promptly proceeded to produce the most successful "Mecheleciv" that has ever been published. The honorary journalism fraternity, Pi Delta Epsilon, lost no time in tapping Chuck and shortly thereafter he was honored by membership in Theta Tau, of which he is currently treasurer. He has twice been a member of the Engineers' Council and was unanimously elected President of that body for the current year. In addition to his engineering activities Plyer also holds one of the most coveted student positions in the University, President of Omicron Delta Kappa, men's honorary activities fraternity, and is also on the Student Life Committee for 1950.



William F. Roeser, one of George Washington University's outstanding Engineering alumni, was born near Perry, Oklahoma, on September 13, 1901. How he has managed to cram so many outstanding activities into the past forty-nine years remains a source of wonder to all who know Bill Roeser's history.

After what he describes as "a really rugged" boyhood spent in Oklahoma and Illinois, where he completed grade and secondary schools. Bill followed his elder brother's footsteps to Oklahoma A & M College. Here he spent his freshman year, collecting two broken shoulders in the process of learning that collegiate athletes, particularly Oklahoma athletes, are a very tough lot. He came to George Washington in the fall of 1920, largely because of a financial crisis arising out of a rubber check given to him in payment for his work during the entire preceding summer. Also in the fall of 1920, Roeser accepted a job with the National Bureau of Standards, with which organization he has been associated ever since.

It was during his years at George Washington that Bill Roeser gave promise of the brilliance which was to distinguish his later years. Bill worked forty-eight hours a week at the Bureau of Standards, and carried fourteen semester hours a semester for five consecutive years. He graduated in 1925 with a BS in Engineering degree (with distinction), a membership in Sigma Tau, and the second highest average in the entire graduating class of the University. During all this time Bill found time to court the young lady of his choice, and in 1926 the two were married.

Soon after receiving his degree, Roeser decided to join the teaching profession. He accepted a full-time teaching job at George Washington, but found that the Bureau of Standards would not accept his resignation. Roeser finally solved this problem by agreeing to continue with the Bureau in an advisory capacity, working there in his spare time. He devoted his main efforts to teaching Electrical Engineering and Strength of Materials at the University, while working on his Masters degree in Physics, which he received in 1929. If all the aforesaid sounds incredible, we can only explain that Bill is an incredible man.

There's a hiatus in the Roeser story from 1929, when he returned to the National Bureau of Standards on a fulltime basis, until 1942. When asked about this period, Bill said he "didn't do anything except work" during those years. He must have been building quite a reputation, for when the impact of the war began to be felt in the Bureau of Standards, Roeser was moved into Metallurgy, where he assumed the duties of Chief of the Mechanical Metallurgy Section and Assistant Chief of the Division of Metallurgy. Bill continued in this post until early this year, when he took over his present assignment as Technical Consultant to the Division of Building Technology.

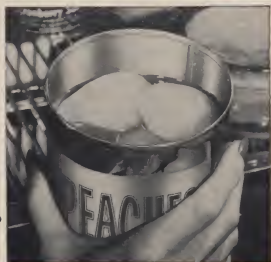
Not the least amazing thing about Bill Roeser is his

(Continued on page 17)

Only STEEL can do so many jobs



HOW TO LIFT A MILLION POUNDS. This crane runway, whose structural steel was fabricated and erected by United States Steel for the San Francisco Naval Shipyard, is 730 feet long, 209 feet high, extends 162 feet over the water at each side. It can lift gun turrets and other huge sections weighing as much as 1,000,000 pounds.



CLEANER THAN YOUR BEST CHINA. The inside of a food can is "surgically clean." Sterilized in processing, it is cleaner and safer than any dish. The Department of Agriculture reports, "It is just as safe to keep canned food in the can—if the can is kept cool—as it is to empty the food into another container." And, incidentally, did you know that "tin cans" are really about 99% steel?

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STAINLESS STEEL GOES TO SCHOOL. What a change from the little red school-house! This new school in California embodies the latest features in school construction, including the use of U·S·S Stainless Steel for architectural trim. The stainless trim resists atmospheric corrosion, harmonizes with the building design. United States Steel produces steel of all kinds for such buildings ... continuing its number-one job of helping to build a better America.

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ENGINEERS' MIXER PLANNED

A "must" for every engineer is the annual Engineers' Mixer, which opens the school year for the engineers. The purpose of the Mixer is to give new students an opportunity to meet the upperclassmen, other new students and their professors in a congenial, social atmosphere. The affairs are completely informal, and although there are a few speeches, each is guaranteed to last no longer than three minutes. Each of the engineering organizations maintains a booth somewhere about the premises where those who are interested can obtain information or membership applications. Refreshments are usually served.

This year the Mixer will be held October 4, 1950, at 8:30 p.m., in the Christian Heurich hospitality hall, the "Old Georgetown Inn." The hall is located at the Heurich Brewery at 26th and D Streets, N.W.

It should be obvious that there will be ample refreshments, and all hands will doubtless be glad to learn that there will be no charge whatsoever. After a program of occasional short speeches, the evening is expected to get more informal. The mixer usually culminates in an impromptu sing-fest, and the Heurich people assure us that there are no neighbors to complain. Soft drinks will be served for those who desire them.

All engineers are invited. It is not essential that one be registered in engineering school. Anyone who is working for an eventual engineering degree is not only welcome, but is urged to attend.

BANQUET HELD IN MAY

The Y.W.C.A. was the scene of the Twenty-second Annual Engineers' Banquet last May, as some one hundred and fifty engineers and their guests gathered together for the final major event of the Engineering School year.

After enjoying a steak dinner, those in attendance were privileged to hear remarks by both our own Dean Feiker and Dr. Cloyd H. Marvin, President of the University, who discussed the progress and the plans for the immediate future.

Following the speakers was the highlight of every Engineers' Banquet, the presentation of awards by the various Engineering School organizations. Recipients of the two principal honors were Bill Whittemore, who received the Theta Tau Activities Plaque, and James Roamer, who was presented with the Alumni Achievement Award. Engineers' Council keys were presented to last year's members by Dean Feiker.

The students provided the first half of the evening's entertainment with their customary sketch mocking the faculty of the Engineering School, but were shocked to find a rebuttal had been secretly prepared by Messrs. Kohloss, Antel, La Hatte and Greely, who rounded out the evening with their surprise presentation.

NEW BUILDING DONATED

It has long been the fond hope of the faculty and students of the Engineering School that same day, somehow, the school would be set up in a new building devoted to engineering only. The additional room for classes, lecture rooms and laboratories is keenly felt in Corcoran Hall, where the Physics and Chemistry people themselves are pressed for room. In such a situation any prospect of relief, however remote, is refreshing. It was in this atmosphere that President Marvin gave us the first inkling of the big surprise which was in store for us, as he addressed the Engineers' Banquet last June. He spoke of the need for a bigger engineering school with a building of its own, but made no reference to any concrete resources except the \$90,000 promised by Mr. and Mrs. Chas. H. Tompkins, which was to be added to from other sources later before the building could be begun.

The big news was finally released at the Convocation in June, when President Marvin, again addressing a part of the student body on the occasion of their commencement, made it known that the same Mr. Tompkins had agreed to contribute a total of half a million dollars! This amount is enough to finance the entire building, as now visualized. The outburst which greeted this announcement was, to say the least, unrivaled in the history of G.W.U. convocations.

Few details are as yet available on the physical characteristics of the new building. Many ideas are now being processed, and it will be many months before the completed plans leave the drawing boards. It is not, however, as though the engineering faculty had been caught unprepared. Many new ideas had already been discussed before the funds materialized, and Asst. Dean Walther had made some twenty trips to eastern technical institutions in search of ideas. The building's exterior will be in a modern or "functional" style of architecture, much as buildings C and D are. It will be located at the present site of Building X, the favorite subject of some of last year's letter-writing readers. Except for the proposed Structural Analysis, enlarged Electronics and expanded Hydraulics laboratories, this exhausts the information presently available. Much news has been circulated recently about another new class building to be begun this fall. Our own engineering building, however, is distinct from this other project, and it is hoped that it will be ready for occupation in two years.

At this point, we would like to say a word about Mr. Tompkins who so generously provided for our Engineering School. He owns the Chas. H. Tompkins Construction Company, a Washington concern, and it is now engaged in constructing the New York Avenue Presbyterian Church and the Wvatt Building, as well as other projects. The Tompkins family all attended the George Washington University, and Mr. Tompkins attended the School of Engineering. The company built many of the classroom buildings which we now use.

COUNCIL REGISTERS

Registration of students in the Engineering School at George Washington this fall is being handled by senior students under the direction of the Engineers' Council, with faculty members in attendance for supervision and Deans' approvals.

Ed Younger, Program Director of the Council, is in direct charge of the student registration assistants. During the past summer Ed has worked out the details of the plan with the assistance of two other Council members, Hugh Bauer and Jim Hampton. Plans were developed by the committee and submitted to the Dean's office and the department heads for corrections and approval.

The third floor of Building D is being used again, as in past registrations, but this year the subjects are broken down into main groups, so that if lines do form at any point they will delay only the students needing to sign up for those particular subjects, rather than the students signing up in a whole department. The separation of the Dean's approvals from the subject sign-up lines was used very successfully in the registration last spring and so has been continued this year. The use of student advisers for new students and transfer students is also continued because of the excellent work done in this line in prior registrations. This year Sigma Tau will furnish the personnel for this work.

Mecheleciv sales personnel have been separated from the traffic control desks, in order to avoid any possible confusion or congestion at this point. The traffic control men will examine all program slips at this desk to insure that students do not form in a line until all prior steps are completed, thus avoiding duplication of efforts, and wasted energy and time.

MECHELECIV STAFF MEETS

The board of Editors of Mecheleciv extends an open invitation to all student engineers interested in staff work to attend an organizational meeting to be held on Tuesday, October 3, at 8:15 p.m., in room 303 of the Student Union Annex.

Any budding Walter Lippmans (or even Henry McLemores) will be welcomed by the editorial staff, which has vacancies in reporting, writing, rewrite and make-up. Advertising salesmen and circulation-men are needed for the business staff.

The editors want to emphasize that no prior experience in any of these fields is necessary. Here is an opportunity for young engineers to learn the fundamentals of the publishing field, and get some valuable experience in writing or selling. Any professional engineer will tell you that much of your time after entering the practice of engineering will be spent in preparing articles for publication in professional journals, and writing reports.

John O. Wagner
Consulting Mechanical Engineer

640 Washington Building
REpublic 7852 Washington, D. C.

GRADUATE OUTLOOK

The Westinghouse Electric Corporation will employ more than 300 engineering graduates this year, or approximately ten percent more than were added last year, George D. Lobingier, manager of student recruitment for Westinghouse, reported recently.

He said that 300 of these would first be assigned to the Graduate Student Training Course, which provides orientation training for the student employees before they are assigned to specific jobs within the Company.

Although record graduating classes have created a temporary excess of engineers, industry will be faced with a shortage of qualified engineers by 1953, Mr. Lobingier predicted.

"Enrollment in engineering schools during the past two years has been comparatively low because of the inability of some graduates to find immediate positions," he said, and added, "Today's college freshman would do well to seek a degree in engineering. From present indications, the demand for qualified graduates in 1953 and 1954 may well exceed the available supply."

Approximately 50 percent of the graduate engineers hired by Westinghouse this year will be assigned to sales positions, Mr. Lobingier said. Another 30 percent will be assigned to engineering departments, and 10 percent to manufacturing departments. Several others will be added to the Company's accounting and treasury departments.

"During the year approximately 75 more graduates will be assigned directly to engineering posts without attending the Graduate Student Course," Mr. Lobingier said. "Such direct assignments are possible only with those who have advanced degrees or who specialized in some limited field of engineering."

Last year 279 persons completed the training course, and an additional 78 were given immediate positions, the Westinghouse spokesman said. The rise in employment this year can be attributed largely to the need for more sales engineers.

COUNCIL VACANCIES

As the school year opens there are several important campus jobs open in the Engineering School, including three memberships on the Engineers' Council. The Council, coordinating body for student activities in the Engineering School, is considered one of the prize campus positions for undergraduates.

At meetings of the societies and fraternities at the last of the school year 1949-50, delegates were elected to the Council in the regular procedure. New delegates were announced to the student body at the annual Engineers' Banquet in May. Sigma Tau delegates for this year are Joseph Rekas and Willis Vary; Sam Collins and James Hampton represent AIEE,

(Continued on page 14)

Russell P. May
Consulting Radio Engineers
MEMBER OF AFCEE

1422 F St., N.W.
Washington, D. C.

Kellogg Bldg.
REpublic 3984

while ASCE delegates are Bill Seabrooke and Ed Younger. Paul Meissner and Paul Couper represent IRE, and Chuck Plyer and Al Moe represent Theta Tau. There are two remaining Council members, a member-at-large elected by the Council itself, and the Editor of *Mecheleciv*.

The new council met before the close of the year to elect officers, and Chuck Plyer for chosen for President, Al Moe as Vice President, and Paul Meissner as Secretary. Bob Curtis was chosen for Treasurer, Ed Younger for Program Director, and Paul Couper for Social Chairman. Bill Seabrooke was chosen as Council nominee for the Student Life Committee.

During the summer the new *Mecheleciv* staff was chosen and has been approved by the Council, with Bill Seabrooke as Editor, Ed McGandy as Associate Editor and Bob Curtis as Business Manager. This vacated the position of one ASCE delegate (dual membership) and the position of Treasurer of the Council. James Hampton has since been elected to the post of Treasurer. Meantime Paul Couper has been called back on active duty with the Marine Corps, leaving one IRE vacancy and a vacancy as Social Chairman. This means three Council positions will be filled in the first few weeks of school, one each by ASCE and IRE, and a member-at-large. The post of Social Chairman of the Council must also be filled.

S.A.M.E. CHAPTER PROPOSED

Several interested students have brought before the Engineers' Council a proposal for the establishment here at George Washington of a student branch of the Society of American Military Engineers. The Council President, Chuck Plyer, has appointed a committee, with Al Moe as Chairman, to study the proposal, ascertain the degree of student interest, and the requirements which must be met to charter a new organization on campus. If this branch is organized, it will bring to five the number of professional engineering societies on the George Washington campus.

The Society of American Military Engineers is an organization whose purpose is to encourage, foster and develop relations between the engineering profession in civil life and that in the military service in the interests of National Defense; to present and discuss in meetings appropriate papers and to procure and disseminate knowledge and information relating to the science of military engineering.

Forty-one colleges and universities have authorized student branches of the S.A.M.E. Student members of these branches benefit from the material and speakers available through the parent organization. Student dues in the organization are \$2.50 a year, which includes a subscription to the "Military Engineer," one of the best technical magazines in the engineering field, and the right to all other society privileges such as the right to participate in excursions and meetings arranged by the National Society, to obtain technical assistance from the Service Department, advice on procedures in seeking government positions and the distinction and endorsement which come from membership in a nationally recognized society.

THE DEAN'S COLUMN

It was pleasant to be invited by your Editor to write a few words of greeting for the *Mecheleciv*'s first issue. It is always good to greet old friends and welcome new ones at the beginning of a year. If you will cast back in your memories to the time, now a fair number of years past, when you were in grade-school, you will recall that you were rather glad to get back to school in the Fall, even then. Now, of course, the drive is stronger, for the serious student is anxious to "get on with the job", and here is a fresh new year to use according to your will.

Many things have happened since last May. I am very happy to tell those of you who do not already know, that the University has received a gift of \$500,000 for a new Engineering Building. This great gift came from Mr. and Mrs. Charles H. Tompkins, who have long been friends of the University and our School of Engineering. It will make possible our dream of a new school. I am sure that every member of the School of Engineering feels the same sense of satisfaction and gratitude that I do, as I contemplate the impending fulfillment of our hopes.

Members of the Engineering Faculty have spent several years studying the best features of other engineering schools, to be used as a basis for our own planning. Even so, detailed plans will require some time to develop, just as in all important projects. Still, it is now possible to look into the future with some degree of assurance, and see much more than just a building. The logical next stages in the development of our School are the establishment of graduate studies and research in engineering and related fields.

It will be necessary for all of us to exert our very best efforts toward creating the potential for his future development. For a school to become great, it must have not only endowment funds but the services of skilled teachers and a ready supply of able students. Faculty, Alumni, and Students—all can find here a worthy cause to strive for.

We mourn the passing of Doctor Arthur F. Johnson, Professor of Mechanical Engineering. Professor Johnson died in June of this year, after an illness of many months. He was one of those whose teachings are not soon forgotten. His death will leave an empty place in our hearts, for he was a friend to all.

Many of you have been working or studying in other fields during the summer, and have therefore felt the stimulus that always comes from grappling with new problems. I, too, had an opportunity to get away for some weeks of uninterrupted study, for the first time in several years. It was an exciting experience, for I studied under and enjoyed the companionship of a great teacher. Such a time is never forgotten by those who have known it. A great teacher leaves his mark, indelibly, on the students who have sat at his feet.

I have in my heart the wish that every student might know that same joy of learning from some inspiring teacher during the year that is just beginning. Each man who seeks, and is fortunate, will some day find his own master, and the reward will be worth the seeking.

The Dean and I greet you, students old and new. May your studies this year be both pleasant and profitable!

C. H. Walther,
Assistant Dean of Engineering.

SOCIETIES AND FRATERNITIES



• Sigma Tau Fraternity is a national engineering honor society. Organized forty-six years ago as a local unit at the University of Nebraska, it has expanded until there are now twenty-five chapters at various engineering schools throughout the country. Xi chapter here at George Washington University was installed in 1921.

The membership of the fraternity is drawn from those men whose scholarship places them in the upper third of the juniors and seniors in the engineering school. Selection from these scholastically qualified persons is further based on the qualities of practicality and sociability. Finally, the approval of at least three members of the engineering faculty is required for each man.

As an added incentive to excellence in scholarship, each chapter of Sigma Tau presents a medal to the student (usually a sophomore) who has attained the highest grades during his freshman year. Here at George Washington the award is made at the annual Engineers' Banquet.

In addition to recognizing scholarship, Sigma Tau works to give service by playing an active part in the various activities of the Engineering School. The tutoring service, which is offered every year by Sigma Tau, is intended to provide occasional help in understanding difficult subjects. In most cases, sophomores and freshmen needing help contact a member of Sigma Tau or mention the matter to their instructor, who can arrange for the meeting.

A project which will be of interest to the faculty as well as the students is the building of demonstration models. These models are being built by Sigma Tau's who are majoring in or are interested in the particular subject to which the model pertains. Students in Hydraulics, Strength of Materials, Mechanism, Statics, Dynamics, Thermodynamics, and many other subjects will benefit by the class demonstrations thus made possible.

Concerning a past project, the construction of the mounting for a six hundred pound bell from the World War I troopship George Washington, no suitable location for it has been found. Possible sites for the proposed victory bell were suggested last year, and were only two in number. One place was the yard between the main University Buildings; the other was the lower part of the roof of the Student Union Building. With regard to the first, permission was not granted by the school, and the second idea was discarded on the grounds that the bell's location would be too obscure. The only hope is that some day the campus will increase its size enough to permit the bell to be mounted safely in a conspicuous place.

The building of a technical library with practical value to engineering students was contemplated at the beginning of last year. The funds for such a project are, however, not enough to build the entire library in a reasonable time. It was therefore decided to make suggestions instead to the School Library as to what technical books they need to complete their reference list and to buy some of them with Engineering Department funds for use in the library.



• A student branch of the American Institute of Electrical Engineers was organized at the George Washington University in 1932 in order that electrical engineering students here might avail themselves of all the opportunities to develop into engineering graduates worthy to assume the responsibilities of their chosen scientific field.

The purpose of the student branch is to provide fellowship and information which is not a part of the regular classroom procedure.

Our organization has much to offer you in activities which help provide you with a well-rounded education. Scheduled for this year are field trips to the Bureau of Standards, Naval Ordnance, Naval Research Laboratory, PEPCO, and possibly other points of interest. In an effort to further enrich our educational program we will present guest speakers at our regular meetings who will talk on the various phases of electrical engineering as it is actually used on the job.

Every year a division conference is held at some school of our district, which includes several states. This fall it will be held at the George Washington University. In the spring a dinner will be given in conjunction with the professional Washington Chapter of AIEE. A joint outing with the student branch of the Institute of Radio Engineers will be held in the spring, and at the outing the IRE's will challenge us to a baseball game. No true double-E should miss these affairs! Your participation is invited.



• Calling all engineers! Calling all engineers interested in radio! We, the student branch of the Institute of Radio Engineers, invite especially EEs to join and actively participate in our growing professional society. Many universities are joining our ranks and as the society

grows we would like our own chapter to grow. To do this we need many new energetic members who, through their own efforts to support the group, will be doing themselves a favor as they will be the ones to benefit.

Our meetings are very informative through the presentation of movies and/or guest speakers who have a wealth of knowledge to pass on to you. Many of these are the same speakers who have addressed the local professional chapter. All this is required of you is an interest in the field of radio and electronics. In addition to movies and speakers we plan on visiting points of interest in and around Washington this year. One of last year's unforgettable trips was to the Westinghouse plant in Baltimore.

An outstanding affair held every spring is the picnic outing with the student branch of AIEE. Last year two of these picnics were held, both in Rock Creek Park. Each time we play softball with the AIEE's. Our record so far is two wins and one loss. This year we will challenge them to another game.

Our meetings are held on the first Wednesday of each month, and notices will be posted for the meetings. Don't forget to reserve that night. You won't be sorry if you join.



- The George Washington University student branch of the American Society of Mechanical Engineers will begin its drive for full membership on the first day of registration, and will continue through the annual Engineers Mixer on October 4. The dues are \$3.50 for the coming school year, which begins October 3rd. A membership card, a pin or watch charm, and a subscription through the May issue to "Mechanical Engineering," the official journal of the society, are given to each member. Any student majoring in engineering is eligible for membership, including graduate students.

During this year we will have many interesting and informative lectures given by prominent engineers at the regular meetings held on the first Wednesday night of each month. In addition to the speakers, we often present movies on old and new engineering projects. These lectures and movies, together with our field trips, can provide you with practical information on just how your formal education will probably be applied after graduation. Our meetings are interesting and yet give the student valuable experience in the procedure and organization of learned societies.

Among the other privileges of membership are the competitions for cash prizes and awards for outstanding papers, use of the Max Toltz student fund (within limits of available funds) and the services of the Engineering Societies Personnel Services, Inc., in helping to find that elusive job after graduation. Student members who wish to transfer to Junior membership after graduation are entitled to suspension of the initiation fee of \$10.00.

- Membership in the student branch of the American Society of Civil Engineers at George Washington University is open to all students who are preparing for Civil Engineering degrees, or the degree of Bachelor of Science in Engineering. The parent society is the oldest of the engineering societies, and membership can be transferred after graduation by qualified members of the student branch without payment of the initiation fee.



Technical meetings of ASCE are held on the first Wednesday of each month during the school year. Talks are given at these meetings by prominent engineers on subjects of general interest. Typical subjects from previous years were "The Dupont Circle Underpass," "City Planning," and "Detailed Planning of Buildings Under Construction." Near the end of each school year a competition is held at which students present papers of their own for prizes.

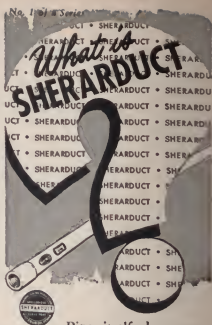
Social life is considered an important part of membership, and dances, fishing parties, picnics and other events are held. Field trips are set up for members to various projects under construction nearby. An Annual Conference with members from other schools in this area is held annually, with a banquet and dance.

- Theta Tau welcomes all Engineering students, especially freshmen, to the University. Gamma Beta Chapter of Theta Tau was established in November, 1935. A professional fraternity for engineers, Theta Tau was founded at the University of Minnesota forty-six years ago. It recognizes ability, sociability and activity in Engineering School Projects and functions. The purpose of the fraternity is to develop and maintain professional interest and to unite its members in the bonds of fraternal fellowship.

Membership is by invitation, and several "get acquainted" parties are held each year for prospective members. The prime requisite for membership is participation in social and professional activities on the campus.

Social activities of Theta Tau are quite popular among the members and many of them have become annual events. Last year's annual football game with the alumni was combined with a shrimp feast the like of which had not been seen for many a year. Bob Cashman, the expert who was responsible for cooking the food, well deserved the thanks of all.

At the Engineers' Banquet, last May, Professor Ames made the presentation of the Theta Tau Activities Award. This award is made annually to that graduating senior who has contributed the most to the School of Engineering during his stay at the University. Last year the award was made to William Whittemore 1949-50 president of the Engineers' Council.



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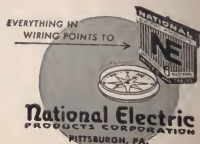
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(Continued from page 6)

the track. When a predetermined number of revolutions have been made by the meter—usually forty—the relay stops the timer and fires another dart into the scale. The distance between darts is read to the nearest tenth of a foot and the time to the nearest one-hundredth of a second. The velocity in feet per second and the revolutions per second are determined from these readings and recorded on a data sheet.

Previous to the summer of 1949, when a new method was adopted, the values obtained were plotted on a large graph and an Ozalid print of the plot accompanied each meter when it was returned. When used in the field, the number of revolutions per second was determined and the velocity of the stream read from the graph. The points, when plotted as revolutions versus velocity, resulted in very nearly straight lines, and for all practical purposes were considered as lying in a straight line. With nearly every meter, however, there is a sharp break in the line at about 2.2 feet per second, so two separate plots are made on the same sheet—one from 0.25 to 2.2 feet per second, and the other from 2.2 to 8.0 feet per second.

The new method of assembling the data is to feed the information into a calculator and obtain the equation of the line, which is of the form $V = mN + a$,

where V equals the velocity, m is the slope of the line, N is the number of revolutions per second, and a is the intercept of the line on the velocity axis. This intercept is caused by the friction of the bearing, which prevents the meter from spinning at low velocities. It is usually a very small velocity quantity. This new method does away with the tedious job of plotting the curves and although not as accurate for some meters as the plot it is within the allowable limits.

(Continued from page 9)

ability in so many different and unrelated fields. He is a member of three sub-committees of the National Advisory Council for Aeronautics, and a member of the National Academy of Sciences. He holds a commendation from the Office of Scientific Research and Development for work in connection with the manufacture of artificial limbs, and another from the Chief of Army Engineers for work on the Manhattan Project, the Army's name for the atomic bomb. Somewhat anti-climactically, Bill is also a member of the Chevy Chase Fire Department.

Throughout all these years, Roeser has never lost interest in the George Washington University. He is still active in the Engineering alumni association and in Sigma Tau, of which he is at present national vice-president.

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(Continued from page 5)

sidered. Basically, an element carrying current is inserted in the tube and the ends of the element inside the tube terminate in two points separated physically, but connected by the flow of electrons. The flow may be controlled by various means, and those tubes used only for rectification are those in which the current can pass in one direction only.

The use of rectifier tubes permits the combination system of power without the necessity of including the extra motor-generator. However, it is still necessary to include the step-down transformers in the locomotive ahead of the rectifier tubes so that the direct current may feed directly into the drive motor.

Experiments with this combination system have been carried out, using ignitron rectifiers, by the Westinghouse company. Results of experimental operation have been so satisfactory that the Baldwin Locomotive Works is now constructing two 6000 horsepower rectifier type locomotives for freight service on the Pennsylvania Railroad. Each locomotive consists of two 3000 horsepower units and produces a maximum tractive effort of 165,000 pounds. The total weight of the locomotive is 660,000 pounds, and it will be carried on 12 axles, all of which are drivers. A dramatic demonstration of the advantages of these locomotives, according to the Westinghouse company, is the fact that motor-generator equipment for a 6000 horsepower locomotive weighs four times as much as

the rectifiers and associated apparatus required to do the same job.

The problem of railway power has thus been approached in the last fifty years from five angles. The steam locomotive applies its power directly. The Diesel and the gas turbine both generate their power on the locomotive, and use direct current electric drive. In central station power supply, a straight alternating current system has been used, and a straight direct current system has also been used. A combination system, in which alternating current is generated and transmitted, and direct current is used for the final drive, has been employed with a number of variations.

Probably the best answer to the problem devised so far is the ignitron locomotive, but this is not the final or completely satisfactory solution. This system reduces the amount of weight carried for rectification purposes, but there is still extra weight. The ideal answer would be some method of direct current transformation, or the development of an alternating current motor with load characteristics similar to those of a direct current series motor.

Probable developments in the next fifty years cannot be forecast with any degree of accuracy, but at no time in the past has the real obstacle been eliminated. The engineer who can develop a D-C transformer will have his fortune assured.



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by CHESTER E. MEYER
*Superintendent, Production Scheduling
General Machinery Division
ALLIS-CHALMERS MANUFACTURING COMPANY
(Graduate Training Course 1938)*

PRODUCTION CONTROL in a big plant like the Allis-Chalmers West Allis Works is a constant campaign to prevent bottlenecks and keep orders moving along smoothly to meet scheduled shipping dates.



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Most men face much the same kind of personal problem when they get out of engineering school and plan a program of graduate training and experience leading to a firm position in the work they want to do. They can't afford to risk bottlenecks and blind alleys in that program, either.

Big Opportunity

I had this in mind when I graduated from MIT in 1936 and enrolled in the Allis-Chalmers Graduate Training Course. I'd been particularly interested in production and sales. I was looking for practical training, experience and opportunity. And I got them.

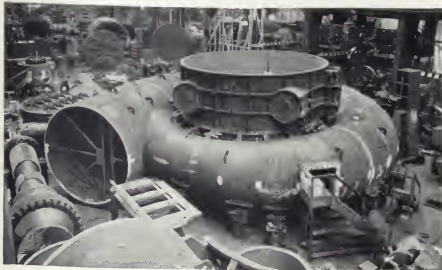
First assignment was in Steam Turbine erection. Then I went to the Centrifugal

Pump Department, and worked on cost analysis. This job gave me a chance to study plant layout and manufacturing methods, and put me in contact with the Time Study and Planning Department. I liked the work, and finished up the course in that department. I've stayed in the same type of work ever since.

Here in Production Scheduling we pick up each job after the Planning Department has established the routing. It's up to us to set a shipping date, and then work out dates when the job is to be completed in the various shops through which it must go. This requires a thorough knowledge of methods, shop capacities and work loads throughout the entire plant.

Great Diversity of Products

To give some idea of the extent of this operation, here are a few facts about the West Allis Works: The floor area of the buildings is more than 160 acres. There are 14 miles of railway and 4 miles of roads within the plant, and the shops contain more than 30,000 power tools, from small precision machines to the great 40-foot boring mill. It requires 208 traveling cranes to handle materials and equipment. There are twelve great machine, assembly and erection shops, three foundries, pattern shop, tank and plate shop, forge shop, mill shop and many miscellaneous buildings used in manufacturing.



Completed parts flow on a planned master schedule from all parts of the great West Allis Works as this large turbine unit takes form. This is a general view of a part of the vast erection shop.



Assembling big direct-current blooming mill motor for test—last step in the manufacturing process before shipment and final installation.

Some of the big jobs going through now include a 107,000 kw steam turbine unit for a midwest utility and two complete new hydraulic turbine and generator units for Hoover Dam. There's an order for six 22,000 hp pumping motors for a West Coast irrigation project, and another for one of the largest power transformers ever built. Rotary kilns up to 400 ft. in length, gyratory crushers weighing 500 tons and 22 million volt Betatrons are all products of these shops. So are delicate electronic and control devices.

Allis-Chalmers designs and builds basic machines for every major industry: steam and hydraulic turbine generators, transformers and other equipment for the electric power industries; crushers, grinding mills, rotary kilns, screens and other machines for mining, ore processing, cement and rock products; flour mills and oil extraction plants; electronic equipment; big pumps, motors, drives . . . to name just a few.

Widest Choice

As you can see, Graduate Training Course engineers at A-C can move in just about any direction they choose—any industry, any type of work from machine design, research and product engineering to manufacturing, selling and installation.

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